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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/894,728	06/28/2001	Hassan S. Hashemi	00CON159PC-CIP4	9014

25700 7590 05/06/2004

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EXAMINER	
CRUZ, LOURDES C	

ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	09/894,728	HASHEMI ET AL.	
	Examiner	Art Unit	
	Lourdes (Elle) Cruz	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2004* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *17 February 2004* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Selna (US 5640048) in view of Terasawa (US5942797).

Selna discloses (See cover Fig.) a structure comprising:

A substrate 52,54 having a top surface for receiving a chip 12; a printed circuit board 18 attached to a bottom surface of said substrate; at least one signal via 6A in said substrate; said at least one signal via providing an electrical connection between a device electrode (on 12, connected to 22/24) of said chip and said printed circuit board;

A plurality of separate thermally conductive vias 6C in said substrate; each of said plurality of separate thermally conductive vias being coupled to a heat spreader 10C, said heat spreader being attached to said bottom surface of said substrate. See that the plurality of thermally conductive vias provides a connection between said chip and said heat spreader (see layer 8C).

Selna also discloses:

- Said chip being a semiconductor chip

- Said substrate comprises organic/ceramic material (Col. 1, lines 15+)
- Said at least one signal via 6A provides an electrical connection between a bond pads 8A and said PCB 18, wherein said bond pad is electrically connected to said device electrode (through wire 22/24)
- Said signal via abuts the bond pad
- Said bond pad electrically connected to said device electrode by a bonding wire 22/24
- Said at least one signal via provides an electrical connection between said device electrode and a land 10A, said land being electrically connected to said PCB (through 14A)
- Said via abuts said land
- Said at least one signal/thermally conductive via comprises Copper (Col. 6, line 35), which is a thermally conductive material
- See that the heat slug/spreader of Selna is attached to the PCB
- A second plurality of signal vias 6B providing connection between a plurality of device electrodes (on 12, connected to 22/24) of said semiconductor chip 12 and said PCB
- Each of said bond pads is electrically connected to a respective one of the device electrodes

- Said second plurality of signal vias provide electrical connections between each one of said plurality of device electrodes and a respective one of said lands 10B, said lands being electrically connected to said PCB (through 14B)

However, see that Selna fails to specifically disclose:

- A MCM, or a second chip
- The second chip connected to a second heat spreader

Nonetheless, Terasawa discloses (see cover figure) first and second chips 2 connected to first and second heat sinks 33.

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to incorporate the teachings of Terasawa to those of Selna in order to provide individual heat sinks to individual chips such that better individual heat dissipation is provided.

Regarding **claim 7**:

See that Selna in view of Terasawa teach all the structural limitations above. However, Selna in view of Terasawa fail to specifically disclose:

- Materials such as FR4 for the substrate

Nonetheless, materials such as FR4 are well known and widely used among semiconductor artisans. Also, see that such materials are not considered to be Applicant's invention. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate materials such as FR4 to the invention of Selna in view of Terasawa since they are readily available, they are well known and widely used in the art as explained above.

Response to Arguments

Applicant's arguments filed 7-11-2003 have been fully considered but they are not persuasive. Applicant argues that:

- Selna (Primary reference) does not anticipate the claim invention for failing to disclose two semiconductor dies on top of a substrate
- Terasawa (Secondary reference) fails to disclose first and second dies attached atop a substrate, and heat spreaders. Applicant also argues that conductors "are not similar to heat spreaders".
- Terasawa does not disclose a single substrate that includes heat spreaders attached to a bottom surface of the substrate coupled by respective vias to semiconductor dies attached to the top surface of the substrate.

The above arguments are not persuasive since:

- See the rejection above wherein the examiners admits the primary reference fails to teach an MCM (Multi-Chip-Module). Hence the introduction of a secondary reference that does. See rejection above.
- See Figure 2 of Terasawa wherein chips 1 –read multiple chips— are shown atop a surface of the substrate.
- See that conductors 33 are heat conductive, and are therefore considered heat dissipating, which is the definition of a heat spread. Moreover, labels, statements of intended use, or functional language such as we have here in "heat spreaders" does not structurally distinguish the claim over the prior art which shows a structure that may likewise be labeled, used or fuction as a heat spreader rather than a "shield conductor". See *In re Pearson* 181 USPQ 641, Ex parte Minks 169 USPQ 120, and *In re Swinwhart* 169 USPQ 226.
- See that Terasawa discloses more than one chip – read two chips labeled 1, and two chips labeled 2—. See that 33 are heat conductive and are therefore heat spreaders (also read "labels" explanation above). Also, see that Figure 2 discloses more than one chip 1 on a single substrate. Additionally, see that 33 is below/beneath/under ALL the chips. Moreover, see that wires 51 on chips 1 are connected to vias (see, for example, 32) that are connected to conductors 33.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lourdes (Elle) Cruz whose telephone number is (571) 272-1928. The examiner can normally be reached on M-F 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lourdes (Elle) Cruz
Examiner
Art Unit 2827

Elle Cruz

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